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ABSTRACT

Recent studies have demonstrated that external rewards can affect intrinsic motivation to perform an activity. Money tends to decrease intrinsic motivation, whereas positive verbal reinforcements tend to increase intrinsic motivation. This paper presents evidence that negative feedback and threats of punishment also decrease intrinsic motivation. Subjects solved puzzles during the first part of the experimental session, after which observations relevant to their intrinsic motivation were made. Subjects in the negative feedback condition were given more difficult puzzles to solve than were the controls so that they railed more frequently than the control subjects. Those in the high failure condition showed less imtrinsic motivation following their puzzle-solving session than did control subjects. Subjects in the threat condition received an aversive buzzer each time they were unable to solve a puzzle, while the control subjects did not. Those subjects threatened with the buzzer showed less intrinsic motivation than control subjects. (Author/BW)

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Changes In Intrinsic Motivation As A Function Of Negative Feedback And Threats

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ABSTRACT

Recent studies by Deci (1971, 1972a) have demonstrated that external rewards can affect intrinsic motivation to perform an activity. Money has been shown to decrease intrinsic motivation, whereas positive verbal reinforcements tend to increase intrinsic motivation. The present paper presents evidence that negative feedback and threats of punishment also decrease intrinsic motivation. Subjects in this study solved puzzles during the first part of the experimental session, and then observations relevant to their intrinsic motivation were made. Subjects in the negative feedback condition were given very difficult puzzles to solve so that they failed on more puzzles than the control subjects who were given easier puzzles. Those in the high failure (negative feedback) condition showed less intrinsic motivation following their puzzle-solving session than did control subjects. Subjects in the threat condition received an aversive buzzer each time they were unable to solve a puzzle, while the control subjects did not receive the buzzer. Those subjects threatened with the buzzer showed less intrinsic motivation than control subjects. The results were seen to be consistent with a cognitive evaluation theory presented earlier by Deci (1972a).

When a person engages in some activity for no apparent reward except the activity itself, he is said to be intrinsically motivated to perform that activity. Several recent studies (Deci, 1971, 1972a) have shown that a person's intrinsic motivation for an activity will be affected when he receives external reinforcements for performing the activity. Money has been shown to decrease intrinsic motivation, whereas verbal reinforcements tend to increase intrinsic motivation. Deci has proposed a cognitive evaluation theory to account for these phenomena.

The theory focuses on a person's cognitive interpretation of the activity and his reasons for performing the activity. It suggests that since different reinforcements will be perceived and evaluated differently by a person, different reinforcements will have different effects on his intrinsic motivation.

Specifically, the theory states that there are two processes by which intrinsic motivation will be affected. One process involves a change in the person's perception of locus of causality (Heider, 1958; de Charms, 1968). When he is intrinsically motivated, the locus of causality of the activity is within himself; however, when external reinforcements are introduced, he may become dependent on those external reinforcements. He is, therefore, performing for the external reinforcement rather than for the intrinsic enjoyment. The locus of causality has shifted from within himself to the external reinforcement, and he would be less likely to perform the activity in the absence of these reinforcements. His intrinsic motivation has decreased.

Deci (1971, 1972a) has reported studies in which money has been given as external rewards to subjects who performed intrinsically motivated activities. Money is widely perceived as an effective control mechanism (Skinner, 1953; Opsahl & Dunnette, 1966), and the experiments indicate that the subjects did, in fact, become dependent on the external rewards and lose intrinsic motivation.

Kiesler and Sakumura (1966) have reported results that are consistent with these. They found that if people stated opinions which they believed and received large payments ($5) for doing so, they were more susceptible to counterarguments than people who stated the opinions for small payments ($1). The cognitive evaluation interpretation of this is that the larger the payment, the more the subjects came to believe that they were performing for the payment, so the less strongly they held to their original attitudes because they no longer perceive of their attitudes as the reason for their behavior. There are also numerous other studies which bear on the cognitive evaluation theory; however, they will not be reviewed here as they have been discussed elsewhere (Deci, 1971; 1972b).

The second process by which intrinsic motivation can change is related to information or feedback. When a person is performing an intrinsically motivated activity, there are positive value properties (Koch, 1956) associated with the activity. If he then receives feedback, the value properties associated with this feedback may not be phenomenologically distinguishable from the value properties which the person associates with the activity itself, so there is a change in the total amount of positive

value. Therefore, if a person receives positive feedback, the positive value properties from the feedback increase the total positive value properties associated with the activity, causing an increase in his intrinsic motivation. That is, there is an increase in his tendency to perform the activity in the absence of external reinforcements because of the positive value that he experiences from the activity. This positive value which the person experiences from the feedback may be due to a confirmation of his competence or his sense of self-determination.

Deci (1971, 1972a) has reported that subjects (especially males) who were rewarded for solving puzzles with positive verbal reinforcements from the experimenter (e.g. "That's very good; this puzzle was a difficult one") showed an increase in intrinsic motivation for working with these puzzles.

Negative Feedback: If a person doing an intrinsically motivated activity receives negative feedback about his performance, this feedback could cause negative value properties to be associated with the activity. In the same way that positive feedback and the resulting positive value strengthens intrinsic motivation for an activity, negative feedback should decrease a person's intrinsic motivation because the negative feedback offsets some of the positive value of the activity. The negative feedback would weaken his feelings of competence and self-determination, making the activity less rewarding. As a result, he would be less likely to do the activity in the absence of external reinforcements; that is, he would be less intrinsically motivated to do the activity. One would

expect, then, that if subjects were given very difficult tasks and if they failed badly at them, the feedback which they receive from failing at the task would cause a decrease in intrinsic motivation.

Hypothesis I

People who receive self-administered negative feedback about their performance on an intrinsically motivated activity will show a decrease in intrinsic motivation.

We know of no evidence which tests Hypothesis I; however, there is some work by Feather (1966, 1968; Feather and Saville, 1967) which is related. He has shown that negative feedback about performance causes subjects to perform less well and have less confidence about subsequent performance. While this is not evidence in support of Hypothesis I, it does seem to complement it.

Threats of Punishment: Subjects who were paid for performing an intrinsically motivated activity showed a decrease in intrinsic motivation (Deci, 1971, 1972a). It was suggested that this was due to a shift in perceived locus of causality from within the person to the external reward. By this same process, then, one would expect that if a person who was performing an intrinsically motivated activity begins to receive threats of punishment for not doing the activity satisfactorily, his behavior will become dependent on that external reinforcement (avoidance of punishment), and he will lose intrinsic motivation.

The threat of punishment will phenomenally, be a strong controller of his behavior. Kite (1964) reports that punishments tend to be per-

ceived as more powerful external forces than rewards. Hence, we would expect that the person who receives threats of punishment will come to perceive that the reason for his behavior is the avoidance of the aversive stimulus. The perceived locus of causality of that activity will have switched to the external control, and he will have less intrinsic motivation.

Hypothesis II

If a person receives threats of punishment for not performing satisfactorily on an intrinsically motivated activity, his intrinsic motivation for that activity will decrease.

Although there is no direct evidence which bears on Hypothesis II, there is some indirect evidence from research on "insufficient justification" (Festinger, 1961; Aronson, 1966) which is related to the hypothesis.

Aronson and Carlsmith (1963) have reported that children who refrained from playing with an attractive toy because of strong threats derogated the toy less than children who were given mild threats. Children who got strong threats refrained because of these threats (i.e., because of an external control), and they felt no need for internal justification. Those who refrained because of mild threats, however, did change their attitudes toward the toy as a means of justifying their behavior. When there was insufficient extrinsic control, they developed intrinsic control, namely, derogating the toy so they wouldn't "want" to play with it.

Freedman (1965) has reported similar findings. Children who received mild threats (rather than strong threats) for refraining from playing with an attractive toy not only derogated the toy, but were less likely to play with that toy in a free situation as much as two months later.

These studies suggest that people will develop intrinsic control when there is insufficient external justification. Although these results need not imply that external controls (i.e. threats of punishment) will decrease intrinsic motivation, they are nonetheless consistent with that prediction.

METHOD

Subjects in this experiment were 64 undergraduates at The University of Rochester who were randomly assigned to three conditions.

Each subject participated for a one-hour session during which he spent much of his time working on a puzzle called Soma. The puzzle is composed of seven different pieces, each of which is made to look like it is three or four one-inch cubes. These pieces can be fitted together to form millions of configurations--only a few of which were used for the experiment.

The first experimenter met each subject in a waiting room and escorted him to the experimental room where he was seated at a table. The experimenter then left through a door at the back of the experimental room so that he would be outside the room observing through a one-way window. The subject knew, of course, that the experimenter was observing him, and

he communicated with the experimenter through an intercom.

On the table in front of the subject were the seven puzzle pieces--each with a number on it so that the experimenter could refer to it over the intercom. To the left of the subject was a stack with either three or four configurations that he would be asked to reproduce. To his right were three other configurations. The top one of the three was a sample; the other two will be discussed below. On another table to the subject's right were the microphone, speaker, recent issues of three magazines (New Yorker, Time and Playboy), and an ashtray.

When the experimenter got to his position behind the one-way window, he read the instructions to the subject. The subject was told that it was an experiment to study certain problem-solving concepts, and he would be asked to solve some puzzle problems. After the instructions were read, the experimenter told the subject to look at the sample to his right. He was told how it could be solved and was allowed about a minute to manipulate the pieces and reproduce it. The subject then worked on the puzzle configurations in turn.

During the session, the subject was asked to reproduce the configurations which had been drawn on paper for him. The time to complete each configuration was measured with a stop watch, and if a subject were unable to reproduce a configuration within ten minutes, he was stopped and then he assembled it as the experimenter explained how. This let him know that all the configurations were possible.

The Soma was chosen as the expe.. ' task for several reasons. First, pilot testing showed that coll indeed consider it an intrinsically interesting task; secon iety of possible configurations of the puzzle, ranging from very possible; and third, by numbering each piece differently the ex, .imenter could easily explain the correct solution over the intercom so he did not have to be in the room. This decreased the possibility of experimenter bias (Rosenthal, 1966).

There were 16 subjects in the c. rol group. They were asked to reproduce four configurations wh .. were relatively easy configurations, although the difficulty of the four varied.

To test Hypothesis I, that self-administered negative feedback would cause a decrease in intrinsic motivation, 24 subjects in one experimental group were given different Soma configurations to reproduce. The first two of these were very difficult to solve. All but three of the subjects were unable to solve both, and those three were unable to solve one of the two. The third configuration was much easier and was the same as the third one used for the control group and the other experimental group. The manipulation then, was that the experimental subjects were given much more difficult puzzles, which were expected to lead to a much higher failure rate.

To test Hypothesis II, the 24 subjects in the second experimental group were given the same four relatively easy puzzles as the control subjects were given. They were told that if they were unable to solve

any of the configurations within ten minutes, a buzzer would sound indicating that their time was up for that configuration. They were then given a short (about 1 second) exposure to the extremely noxious buzzer. The subjects, therefore, realized that if they were unable to solve a configuration, they would be punished with a noxious stimulus. The difference, then, between the second experimental group and the control group was that the experimental group had been threatened with punishment for not performing well. Consequently, they were performing the intrinsically motivated activity partially to avoid a punishment.

To obtain the independent measure of motivation, the experimenter left his position for a period of eight minutes following the puzzle solving. The pretext was as follows: When a subject had completed the four puzzles, the experimenter told him that he had done all the problem solving which he had to do, but there was one more thing which he would be asked to do, and that was to complete a short questionnaire. Since it was an experiment in problem solving, the subject would be asked a few questions about the way he had solved the puzzles. However, there were four different sets of questions, only one of which would be most appropriate for this subject and that would be determined by how he had done on the puzzles. To select the appropriate set of questions, data from the session would be fed into a computer through a teletype. To do this, the experimenter would have to leave for a short time, 5 to 10 minutes. The subject was told that he could do anything that he cared to during that time, but he was asked to stay in the room. The experimenter

left his position and entered the experimental room through the back door and exited through the front door. He then, very noisily, climbed a small set of steps outside the room and left the lab area through a door at the top of the stairs. The subject could hear him climb the stairs and open and close the door.

The subject was then alone in the room and was free to work on the puzzles, read magazines, or do anything he liked. Therefore, the amount of time out of the eight minutes which he spent working on the puzzles was used as the dependent measure of intrinsic motivation. It was reasoned that if he worked on the puzzles when he was alone for this "free-choice" time and when he was given an opportunity to do other things, then he must be intrinsically motivated to do the activity. The amount of time out of the eight minutes which the subject spent working on the puzzle was determined by a second experimenter who observed through the one-way window and used a stop watch to record the time. The second experimenter was blind to the condition and also to the hypotheses of the experiment. The first experimenter signaled to the second to assume his position just after the first experimenter left the room. The second experimenter got to the outside of the one-way window through a different door which the subjects did not know about. There is no indication that the subjects suspected that they were being observed during this free-choice period.

Since any subject who was unable to reproduce a configuration within the ten minutes allowed was shown the solution, the possibility

that the Zeigarnik (1927) effect would influence whether or not he worked on the puzzle in the eight-minute free choice period was minimized.

The two configurations whose drawings were in the pile to his right under the sample during the entire experiment were impossible to do. This precluded the possibility that a subject would finish a configuration in the eight-minute period and have that be a causal factor in determining whether or not he continued working on the puzzle.

After eight minutes, the first experimenter returned to the room and asked the subject to complete the questionnaire.

RESULTS

Before testing Hypothesis I, it is important to ascertain whether the manipulation was successful, namely, whether the experimental group actually failed on more of the puzzles than the control group. The control group was unable to reproduce 22 out of 64 configurations (34.3 percent) whereas the experimental subjects missed 49 out of 72 (68.0 percent). The difference in the two percentages is highly significant, indicating that the manipulation was successful.

It should be noted that the subjects in the first experimental group were given only three puzzles each, whereas those in the control were asked to reproduce four. The reason for this difference was simply pragmatic, to keep the total experimental session less than one hour. Any bias which this might introduce, however, would be expected to be in the direction opposite to the prediction of Hypothesis I for two reasons. First, if each experimental subject were given another difficult puzzle,

then his failure would be even greater, which according to Hypothesis I should produce an even greater decrease in intrinsic motivation. Secondly, a fourth puzzle for each of the experimental subjects would have increased the tendency for a satiation effect causing him to spend less free choice time working on the puzzles. Hence, using only three, rather than four puzzles, for the experimental subjects means the experimental effect would have to be stronger to be detected.

Table 1 shows the results which test Hypothesis I. The control group spent an average of 285.1 seconds of free choice time working on the puzzles, whereas those who were given the difficult puzzles spent

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Insert Table 1 about here.

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only 166.2 seconds working on the puzzles. The difference of 118.9 seconds is significant at the five percent level (one-tailed t-test), thereby supporting Hypothesis I that self-administered negative feedback decreases intrinsic motivation.

The test of Hypothesis II, that threats of punishment will cause a decrease in intrinsic motivation is summarized in Table 2. The experimental subjects who were punished with an aversive buzzer for failure to solve puzzles spent 193.5 seconds of free choice time working on the

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Insert Table 2 about here.

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puzzles, while the control subjects as mentioned above, spent 285.1

seconds. The difference (91.6 seconds) is significant at the .10 level. While this does not reach the customary significance level, it does nonetheless give some support to Hypothesis II.

DISCUSSION

It is clear from the experiment just described and from previous research that external reinforcements do affect intrinsic motivation, and that the cognitive evaluation theory does seem to account for these results.

As was mentioned in the introduction, research in the area of insufficient justification is related to the cognitive evaluation research. In essence, the insufficient justification research shows that persons will develop internal justification or control when there is insufficient external justification or control. In a classic study (Festinger & Carlsmith, 1959) subjects were paid either $1 or $20 for telling another that they had enjoyed a dull task. Those who received insufficient external rewards ($1) for lying grew to like the task more than those who received sufficient rewards. Those who were insufficiently rewarded developed internal justification, namely a more favorable attitude toward the dull task.

In the insufficient justification studies such as the Festinger and Carlsmith study, they begin with a dull, boring task, hence the low reward subjects have insufficient justification (no internal justification, and inadequate rewards) but the high reward subjects have sufficient justification (no internal justification, but sufficient rewards). The prediction is that the insufficient justification subjects will develop intrinsic interest, while the sufficient justification subjects will not. On the other hand, in the cognitive evaluation studies (e.g. Deci, 1971), an intrinsically interesting activity is employed. Hence, the non-rewarded subjects have sufficient justification (intrinsic interest, but no rewards)

and the rewarded subjects have "over sufficient" justification (intrinsic interest, plus substantial rewards). The prediction is that the over justification subjects will decrease intrinsic motivation while the sufficient justification subjects will remain unchanged. The same reasoning applies to the Aronson and Carlsmith (1963) insufficient justification study using threats, on the one hand, and the present Deci and Cascio, over sufficient justification study using threats, on the other. One can see then, that the insufficient justification phenomenon is a sort of mirror image of the over sufficient justification or cognitive evaluation phenomenon.

Nisbett and Valins (1971) point out, however, as did Deci (1971) that the processes underlying the two phenomena are not the same. Cognitive dissonance reduction (Festinger, 1957) is suggested as the process underlying the insufficient justification phenomenon; however, there is no reason to believe that too much justification is dissonance producing. Nonetheless, although the two phenomena have different underlying psychological processes, they are still quite complementary (see Deci, 1972b for a further discussion of this).

Although the findings presented in this paper give further support to the cognitive evaluation theory, there are still many unanswered questions which need to be investigated. It was reported that positive feedback can lead to an increase in intrinsic motivation. However, in one study (Deci, 1972a), one group of female subjects showed a substantial, though not significant, decrease in intrinsic motivation following the experience with verbal reinforcements. It was suggested that the effects of verbal reinforcements might be dependent on the amount or strength of the verbal reinforcements. There are two situations where verbal reinforcements might lead to a decrease in intrinsic motivation. If there were a great deal of positive verbal feedback, subjects could become dependent on

it (especially if the person giving the reinforcement were a significant evaluator). This would cause a decrease in intrinsic motivation through the process of change in perceived locus of causality. Alternatively, the verbal reinforcements or positive feedback might be perceived by the subjects as attempts at ingratiation (Jones, 1964), in which case, the verbal messages would lose their reinforcing value. In this case, intrinsic motivation would not increase because the person does not experience positive value associated with the ingratiating feedback, in fact, he would probably experience negative value which would cause a decrease in intrinsic motivation. A person most often perceives that the other is ingratiating when there is a large amount of positive verbal feedback, so both situations where we are suggesting that verbal reinforcement could cause a decrease in intrinsic motivation involve large amounts of of verbal reinforcements. It is possible, therefore, that there may be some relationship such as an inverted U between amount of verbal reinforcement (or approval or positive feedback) and intrinsic motivation. As verbal reinforcement increases, intrinsic motivation may increase up to a point and then begin to decrease. Of course, this is merely speculative, but represents an interesting question for research.

Similarly, the amount of negative feedback may not be monotonically related to intrinsic motivation. For example, a small amount of negative feedback may serve as a challenge or a stimulation and perhaps increase intrinsic motivation. In the puzzles given to the negative feedback group in this experiment, the first two were very difficult, and many subjects reported after the experiment that they felt like "complete idiots" or "absolute fools" since they were unable to make much progress on these

puzzles. Their competence (White, 1959) and their sense of personal causality (de Charms, 1968), may have been strongly threatened causing negative value to be associated with this activity. This, in turn, leads to a decrease in intrinsic motivation. On the other hand, if there had been a small amount of negative feedback which did not leave them feeling like "absolute fools," their sense of competence may not have been so threatened, and this milder negative feedback could have been perceived as a challenge and led to an unchanged or possibly even enhanced intrinsic interest in doing the activity well. Again, this is speculation, but it may be that the relationship between negative feedback and intrinsic motivation is also something like an inverted U.

In summation, the evidence presented in this and previous papers suggests strongly that intrinsic motivation can be affected by external reinforcements and controls; the cognitive evaluation theory discussed earlier seems useful in accounting for these changes.

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FOOTNOTE

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TABLE 1

NUMBER OF SECONDS OF "FREE-CHOICE" TIME
SPENT BY CONTROL SUBJECTS AND SUBJECTS
IN THE NEGATIVE FEEDBACK CONDITION WORKING ON THE PUZZLES

Control Subjects	Negative Feedback Subjects	Difference	Significance
285.1 n = 16	166.2 n = 24	118.9 s.e. = 70.6	.05

TABLE 2

NUMBER OF SECONDS OF "FREE-CHOICE" TIME
SPENT BY CONTROL SUBJECTS AND SUBJECTS IN THE THREAT CONDITION

Control Subjects	Threat Subjects	Difference	Significance
285.1 n = 16	193.5 n = 24	91.6 s.e. = 68.0	.10